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AUTHOR Black, Harvey B.
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ABSTRACT

During his 1-year fellowship, Dr. Black took courses in methodological areas, including computer science and specialized quantitative techniques, attended symposia, and participated in research and development projects sponsored by the Computer Assisted Instruction Laboratory. He gave a very favorable evaluation to the experience, but noted that a major difficulty encountered was fitting his own individualized interests into the course sequences and research activities of the host institution. (RT)

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INSTRUCTIONAL RESEARCH AND DEVELOPMENT

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POST-DOCTORAL RESEARCH TRAINING FELLOWSHIP PROGRAM

Harvey B. Black, Post-Doctoral Fellow

Dr. C. Victor Bunderson, Director
Computer-Assisted Instruction Laboratory
University of Texas at Austin

June 1, 1969 to August 31, 1970

Grant No. OEG-0-9-530606-4608
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To: Post-Doctoral Research Training Fellowship Program, United States Office of Education

Final Report: Post-Doctoral Research Training Fellowship to Dr. Harvey B. Black, June 1969 through August 1970. Computer Assisted Instruction Laboratory, University of Texas, Austin, Texas. (OEG-0-9-530606-4608.) Authored by Harvey B. Black.

I Objectives of Program

The major objectives were two-fold. I wished to acquire additional experience and training in systematic, validated instructional research and development and secondly to extend conceptual and methodological skills in areas of closely related conceptual learning research.

It was hoped to realize these objectives by undertaking coursework in methodological areas including computer science and specialized quantitative techniques, engaging in symposiac in substantive areas, and by participating in both developmental and research projects sponsored by the Computer Assisted Instruction Laboratory.

II Methods Used in Program

A. Facilities and personnel. The facilities of the Computer Assisted Instruction Laboratory were made fully available to me. This included private consultation with Director C. Victor Bunderson, Assistant Director Dr. Jack Dunham, and other members of the faculty and staff. In addition, I was given office space, clerical assistance, access to the computer facilities and a variety of other facilities and assistance which made my work proceed more effectively.

The University facilities including the library, the computing facilities, and administrative services were also made available in generous proportions.

The faculties of the Educational Psychology Department, the Psychology Department, and the Computer Science Department were most helpful and cooperative. In particular, my project advisor, Director Dr. C. Victor Bunderson, Co-Director Dr. Jack Dunham, and Dr. Wilson Judd of the CAI Laboratory Staff were most helpful. Drs. Peter Paulson, Janet Spence, and Sigmond Koch of the Psychology Department and several faculty members of the Computer Science Department gave me a great deal of personal assistance.

Other elements contributing to my program were visits to conferences and consultation visits to the Arizona State Conference on Computer Assisted Instruction sponsored by Dr. Gerlach and Dr. Robert Siegal's program in CAI in the Alexandria HUMMRO project.

B. Activities and projects. (A summary of the formal aspects of the program is included in Table 1, found on the following page) During the initial summer I engaged in a rather intensive program in the area of computer science, attempting to acquire basic skills in both Fortran and assembly language. I concurrently audited courses in CAI applications with Dr. Bunderson and in the Philosophy of Behavioral Science.

In the fall I continued with work in information structures and computer applications to CAI including exposure to APL and Coursewriter. Additional seminar work was pursued in cognitive learning research with

Table I

ACADEMIC PROGRAM

Harvey Black
Research Training Post-Doctoral Fellow

	Summer 1969	Fall 1969	Spring 1970
I. Computer Science (up to 30 credits)			
A. Programming & Systems	304 Intro. to Computer Sciences 310 Computer Organization & Programming	340 Information Structures	372 Computer & Prog. Systems
B. Non-Numerical Applications	395 Conference: Topics in CAI - Bunderson	395T Natural Lang. Processing or 381K Artificial Intell. or 383 Comp. Asst. Instruct.	
II. Psychology & Ed. Psych. (Approx. 12 credits)			
A. Stat. & Design	382 L History, Theory, Meth. in Psychology (audit)	384. 2 Intro. to Linear Stat. or Adv. Infer. Stat. (Jennings)	
B. Learning & Instr.	379 K Math. Models of Learning or also Dunham, Gough, Spence	Learning or Psych. or related	Learning or Psych. or related (Koch)
III. Research & Dev. (Conf.) Project Experience	(Conference)	NSF Project with Bunderson & others	Validation Study of Math Pre-Skills CAI Program

Dr. Dunham. In addition, I reviewed behavioral modification literature with Dr. Janet Spence.

In the spring I worked on the application of the small computer to psychological research (particularly the PDP) and associated programming considerations. In addition, I participated in a topical seminar in CAI instructional design and research with Dr. Bunderson. I audited a stimulating seminar with Dr. Sigmund Koch considering the humanistic considerations of modern psychology.

Particularly during this latter period I became involved in a research project testing certain learner-controlled strategies in CAI which had been funded by NSF. I contributed to the design of the evaluation instruments. I also participated in the preparation of a proposal titled "Zenograde Systems Minicurriculum for Instruction in Systematic Instructional Design, Development, Evaluation and Research" which was submitted by the CAI Laboratory to the USOE, ESEA Title IV.

I also continued the development of conceptual papers in the area of research training. These papers are now in the process of preparation for publication. Finally, I began research leading to conceptual papers and subsequent research in the area of systematic training of self-monitoring skills affecting attention, learning and memory.

III Evaluation of Extent to Which Objectives Were Met

A. Experience in systematic instructional research and development. The major objectives were in large part realized. The opportunity to participate in a large, functional and productive instructional development

complex was invaluable in gaining new perspectives into the process. The involvement was not only at the conceptual level through both research oriented seminars with planning staff, but also included meetings with operational staff and direct involvement in the ongoing process of instructional development and evaluation.

This experience has had a major effect upon my professional direction. My earlier work might be described as learning research rather than instructional research. While I continue to feel that educational psychologists must continue to perform such research, I feel a new interest and conviction regarding the appropriateness of well conceived developmental research. Because of these feelings, I am now holding a new position of Professor of Educational Psychology at Brigham Young University and Associate in Instructional Research and Development. My responsibilities include directing developmental projects with the related analysis and evaluation required for instructional design. In addition, I am working with doctoral students and our faculty in the development of a more articulated theory of instructional development. While these activities are not unrelated to my earlier work, they are significantly reoriented closer to the direction that I perceived the Texas CAI Laboratory to be taking.

My research interests are strongly influenced by the operations models and instructional theory concepts that Dr. Bunderson and Dr. Dunham have been developing at Texas. At Brigham Young University we are currently extending these notions and other notions developed here by Dr. M. David Merrill in an integrated research program which presents

considerable promise of continued productivity.

Position papers are now in preparation with regard to (1) the training of instructional designers, (2) strategy training using both task structuring and conditioning procedures, and (3) strategies for integrating a theory oriented program of research on information processing strategies for instructional design.

B. Development of conceptual and methodological skills objective. This objective was effectively satisfied with respect to the development of conceptual knowledge. My work with Professors Bunderson, Dunham, Paulson, Spence and Koch in theory oriented courses and seminars was most stimulating and productive. The opportunity to test ideas with them and their students helped bring me up to date in several areas including instructional theory, information processing theories of concept learning, behavior modification theory and research and humanistic psychology. A number of research directions have been suggested and are now in process of development with graduate students here at Brigham Young University.

The second part of the objective relating to the development of methodological skills was less well satisfied. There are probably two reasons for this partial success. The first is that the original objectives were probably somewhat unrealistic considering the limited time. This factor was further agravated by the perenial problem of finding appropriate sequences of courses in a restricted time frame.

The strategy of beginning with an intensive summer was very productive. I took this opportunity to gain basic computer programming skills and found

it to be very rewarding. During the regular semester, however, sequencing and other conflicts made the anticipated sequence impossible to realize. Courses were either overly redundant, inappropriate in content, or not available. Some skills were acquired in the context of my work on projects, but my earlier notion of a systematic program in computer science methodology did not progress as far as I had wished. I feel, however, that I am now able to either proceed by self study or more knowledgably recruit capable methodologists to achieve my immediate professional goals.

IV Suggestions

It must be observed that graduate academic programs are set up for structured doctoral sequences. This poses a variety of problems for a one year special program including difficulties in tailoring courses and programs to fit specific needs. For example, an ideal program would have allowed a year's sequential program in computer science prior to more specialized involvement in applications. This was not possible in a one year's program.

A. Methodology. Because of the very successful experience during the summer, I feel that summer sessions during which intensive and relatively structured programs free of competing activities could be undertaken might provide a more profitable approach for the strengthening of methodological skills. They might be patterned after the NSF summer institutes in methodological areas. Many existing institute programs may be more formally organized than is needed for a post-doctoral fellow, but the general idea might be feasible. It seems that such institutes would have

the further advantage of being relatively less expensive than full year programs.

B. Colleagueship. One type of liaison which a post-doctoral fellow might form with an institution which might be mutually profitable is that of jointly funded research or development projects. Such an arrangement allows for effective levels of interaction with faculty members with mutual interests without placing undue pressures upon the resident faculty members and without disrupting his normal activities. Such a liaison makes it possible for the sponsoring faculty member to extend his activities into desired directions without diluting his energies by assuming additional and sometimes unrelated tasks.

The joint funding strategy seems to offer increased benefits to the government in that products of interest to them will be produced. It also provides benefits in the sector of scholarly growth to the post-doctoral fellow since a number of studies have shown that one of the most effective ways of acquiring new skills is in engaging in projects which require their development rather than by taking formal courses. Furthermore, it leads to publications and other scholarly rewarding outcomes.

These impressions were confirmed in conversations with other post-doctoral fellows who indicated that the student mode is most inefficient for persons accustomed to self-initiated scholarly work (which is, of course, one of the main criteria for selecting post-doctoral candidates as I understand it).

Several of them commented that they found that the most effective

means of scholarly growth was that of continued writing and research. The availability of a particular library or specialized resource, such as the CAI Laboratory, may be very important but particular courses or even particular faculty members may be expected to be less effective than one might hope unless there is some common project to ensure significant interaction.

V Conclusion

I hope that the comments made are not taken as a negative comment upon my own particular experience. I hope that I have made it perfectly clear that my sabbatical year was a particularly fruitful year and resulted in my gaining a number of important skills and more importantly for me a new perspective on my career which was in part responsible for my new position in the Instructional Research and Development Laboratory at Brigham Young University. My reason for making the above comments is a hope that the above suggestions might be considered in establishing future priorities for training. In particular I feel that the following strategies should be seriously considered:

1. Where specific methodological updating is indicated, the summer workshop format used so successfully by the NSF might be encouraged. This would be particularly useful in areas such as computer applications, quantitative modeling, etc. The attempt should be to provide initial experience and to direct participants to effective resources rather than provide substitutes for extended courses.
2. In the area of stimulating innovative scholarship the strategy of encouraging jointly funded research and development projects seems

especially productive. Such liaisons have been formed in the past in various laboratories, but they might be encouraged by USOE as part of the initial planning of major funded research and development projects. This would hopefully have many payoffs for all the parties involved without some of the limitations of attempting to adapt existing formal programs to an itinerant scholar. May I say that this type of cooperative scholarship which occurred towards the end of my tenure at Texas was an example of the type of experience that I am urging.